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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/605,604 | 10/13/2003 | Chandrasekhar Sarma | FIS920030321US1 | 2603 |
| 29371 | 7590 | 12/07/2004 | EXAMINER | |
| CANTOR COLBURN LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 | | | | DANG, PHUC T |
| | | ART UNIT | | PAPER NUMBER |
| | | 2818 | | |

DATE MAILED: 12/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|-----------------|--------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/605,604 | SARMA ET AL. |
| | Examiner | Art Unit |
| | PHUC T DANG | 2818 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 13 October 2003.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-16 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 9-16 is/are allowed.
- 6) Claim(s) 1,3,4 and 7 is/are rejected.
- 7) Claim(s) 2,5,6 and 8 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 13 October 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>101303</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____. |

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DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on October 13, 2003 is acceptable.

Information Disclosure Statement

2. The office acknowledges receipt of the following items from the applicant:

Information Disclosure Statement (IDS) filed on October 13, 2003.

Specification

3. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hinogami et al., hereinafter "Hinogami" (U.S. Patent No. 6,514,647 B1).

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Regarding claim 1, Hinogami discloses a method for aligning an opaque, active device in a semiconductor structure, the method comprising:

forming an insulating layer (410) over an insulating layer (404) formed on a lower metallization level (402), the lower metallization level including one or more alignment marks (403) formed therin; and

patterning an opening (Fig. 7 ©) a portion of the insulating layer (410) corresponding to the location of the one or more alignment marks (403) in the lower metallization level (402) so as to render the one or more alignment marks (403) optically visible; and

patterning the opaque layer (410) with respect to the lower metallization level (402), using the optically visible one or more alignment marks (403) [Fig. 7 © and col. 15, lines 43-col. 16, lines 31].

Hinogami discloses all the features of the claimed invention as discussed above, but does not disclose an insulating layer is either an opaque layer or an optically transparent layer as cited in claim 1.

Using an insulating layer as an opaque layer or an optically transparent layer in the above process is considered to be obvious in a design of choice, since any insulating layer could form by any material that can be opaque or transparent. Thus, it would have been obvious to one having ordinary skilled in the art at the time the invention was made to form an insulating layer as an opaque layer or an optically transparent layer in the Hinogami's reference for a purpose of enhancing reliability of the semiconductor structure.

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Regarding claim 3, Hinogami discloses a step further comprising a hardmask 9411, Fig. 7 ©) over the opaque layer (410, Fig. 7 ©).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hinogami in view of Nuetzel et al., hereinafter “Nuetzel” (U.S. patent No. 6,784,091).

Hinogami discloses all the features of the claimed invention as discussed above, but does not disclose the hardmask further comprises a titanium nitride (TiN) layer.

Nuetzel, however, discloses the hardmask further comprises a titanium nitride (TiN) layer [col. 4, lines 28-29].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to apply the teaching of Nuetzel to Hinogami discussed above such that the hardmask further comprises a titanium nitride (TiN) layer for a purpose of improving a process for aligning an opaque, active device in a semiconductor structure.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hinogami in view of Ouchi et al., hereinafter “Ouchi” (U.S. patent No. 5,768,107).

Hinogami discloses all the features of the claimed invention as discussed above, but does not disclose the one or more alignment marks comprise copper.

Ouchi, however, discloses the one or more alignment marks comprise copper [col. 6, lines 14-15].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to apply the teaching of Ouchi to Hinogami discussed above such that the

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one or more alignment marks comprise copper for a purpose of improving a process for aligning an opaque, active device in a semiconductor structure.

Allowable Subject Matter

6. Claims 9-16 allowed.

The following is a statement of reason for the indication of allowable subject matter:

Claims 9-16 are considered allowable since the prior art of record and the considered pertinent to the applicant's disclosure does not teach or suggest the claimed invention. None of the Prior Art of record disclose are suggest a step of forming an MTJ stack layer over an optically transparent layer formed on a lower metallization level, the lower metallization level including one or more alignment marks formed as cited in claim 9.

Claims 2, 5-6 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims because these claims are depend the independent claim 18.

None of the Prior Art of record disclose are suggest the optically trans-parent layer comprises a tantalum nitride (TaN) layer as cited in claim 2 and the photoresist material used to pattern the opaque layer with respect to the lower metallization level is also used to protect the opened portion of said opaque layer corresponding to the location of the one or more alignment marks as cited in claim 5 and a step of forming an oxide hardmask over an exposed portion of the optically transparent layer as a opening a portion of the opaque layer as cited in claim 6 and a step of patterning and opening a portion of said opaque layer is implemented through topographic alignment as cited in claim 8.

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Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.
8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.
9. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

PT 

Primary Examiner

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